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Yorkshire Philosophical Society.

ANNUAL REPORT

FOR

MDCCCLXXXIX.



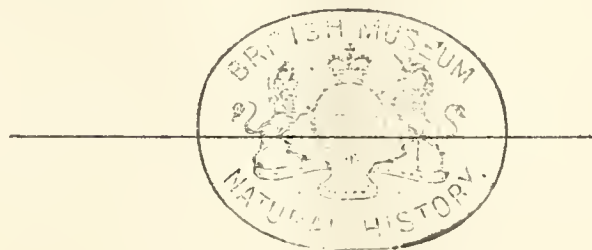
ANNUAL REPORT
OF THE COUNCIL
OF THE
YORKSHIRE
PHILOSOPHICAL SOCIETY

FOR

MDCCCLXXXIX.

PRESENTED TO THE ANNUAL MEETING,

FEBRUARY 4TH, 1890.



YORK:
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1890.

TRUSTEES
OF
THE YORKSHIRE MUSEUM,

APPOINTED BY ROYAL GRANT.

TEMPEST ANDERSON, M.D

EDWIN GRAY.

WILLIAM LAWTON.

F. L. MAWDESLEY.

T. S. NOBLE.

S. W. NORTH.

REV. CANON RAINE, D.C.L.

WILLIAM WALKER.

PATRONESSES

OF THE

Yorkshire Philosophical Society.

HER MAJESTY THE QUEEN.

H. R. H. THE PRINCESS OF WALES.

PATRONS.

H. R. H. THE PRINCE OF WALES, K.G.

H. R. H. THE DUKE OF CONNAUGHT, K.G.

HIS GRACE THE ARCHBISHOP OF YORK, F.R.S.

OFFICERS OF THE SOCIETY, 1890.

PRESIDENT:

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VICE-PRESIDENTS:

THE RIGHT HON. LORD LONDESBOROUGH.

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WILLIAM MATTERSON, M.D.

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HON. TREASURER:

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HON. SECRETARY:

T. S. NOBLE, F.G.S.

CURATORS :

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MINERALOGY	W. H. HUDLESTON, M.A., F.R.S.
INSECTS AND CRUSTACEA . .	G. C. DENNIS.
COMPARATIVE ANATOMY . .	T. ANDERSON, M.D.
ORNITHOLOGY	J. BACKHOUSE, JUN., F.Z.S., M.B.O.U.
ANTIQUARIAN DEPARTMENT . .	{ REV. W. GREENWELL, D.C.L. F.R.S. REV. CANON RAINE, D.C.L.
BOTANY	WILLIAM MATTERSON, M.D.
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OBSERVATORY	T. S. NOBLE, F.G.S.
METEOROLOGY	J. E. CLARK, B.A., B.Sc.
LABORATORY	J. F. WALKER, M.A., F.I.C., F.C.S., London & Berlin.
LIBRARY	{ REV. H. L. CLARKE, M.A. REV. JOHN HEY, M.A.

 KEEPER OF THE MUSEUM :

HENRY MAURICE PLATNAUER, A.R.S.M., B.Sc.

REPORT OF THE COUNCIL

OF THE

YORKSHIRE PHILOSOPHICAL SOCIETY,

FEBRUARY 4TH, 1890.

In presenting their Report for the year 1889, the Council are glad to be able to state that the Balance Sheet of the Society discloses a favourable state of things for the past year. The members will be aware that in the year 1888 there came into operation a new series of Rules, which, to some extent, affected the finances of the Society, by thenceforth remitting the Admission fee to new subscribing members. The result was that a considerable number of new members was added to the Society during that year. It is satisfactory to know that a similar result has been attained during the past year, and no less than 43 new subscribing members have been added to the Society's Roll.

The members will be aware that in the preceding year the Council arranged for a series of Lectures to be given, some voluntary, and others at considerable cost. These Lectures were attended by a large number of subscribers and citizens, and appear to have given great satisfaction.

The cost, however, of these Lectures has been considerable, a sum of £183 4s. 10d having been paid in connection therewith, but this includes a sum of £39 19s. 0d. paid for Lectures and Conversaziones in the year 1888. The total sum received for admission, sale of tickets, and donations, amounts to £110 3s. 8d., leaving the total cost of Lectures, carried out on the debit side of the account for the year, £73 1s. 2d. for the two seasons on this particular item alone. The Council, however, cannot regret the expense considering the great pleasure these Lectures have afforded the members of the Society. The Council cannot dismiss this part of the Report without specially thanking those who kindly volunteered Lectures without cost

to the Society. The Lord Bishop of Ripon, in his Lecture on "Dante," given on the invitation of His Grace the Archbishop of York, the President of the Society, drew a very large audience to the York Concert Room where the Lecture was delivered, and the receipts form a considerable item in reducing the cost paid for other Lectures. The Council are also indebted to the Rev. Professor G. F. Browne, B.D., for a Lecture on "Subterranean Ice"; to Henry Seebohm, Esq., F.L.S., F.R.S., for a Lecture on "The Migration of Birds"; to H. H. Howorth, Esq., M.P., F.S.A., for a Lecture on "The Mammoth and its Lessons"; and to Dr. Tempest Anderson, who kindly gave two Lectures "The Volcanic Region surrounding the Lipari Islands in the Mediteranean," and "Photographic Notes on a Tour in Norway." Dr. Anderson's Lectures were illustrated on the screen by Photographs taken by him upon the spot, and exhibited by the aid of the Lantern. The Council have also to express their special thanks to Dr. Tempest Anderson, not only for the Lectures, but for his kindness in presenting the Society with the Lantern which has been of great use in aiding illustrations to other Lectures. The Council will now state briefly the Income and Expenditure of the Society, and the Report will then pass on to describe the state of the various Scientific Departments of the Museum.

The total Income of the Society is £1225 14s. 1d.; the outgoings £1257 7s. 2d., but as the balance in the hands of the Treasurer on the 31st December, 1888, was £31 17s. 5d., and the excess of Expenditure over Income for 1889 was £31 13s. 1d., a balance of 4s. 4d. remains in the hands of the Treasurer on the 31st December, 1889.

GEOLOGY.—The Collections in this department have received considerable additions during the past year. Several gaps have been filled up through the kindness of Mr. J. F. Walker, and the Honorary Curator has made some important donations, the most noteworthy being a fine collection of Saurian remains from the Lias of Whitby.

The value of the collection is being considerably enhanced by the systematic figuring of many of our best specimens, undertaken by the Honorary Curator. Last year Mr. Reed

presented a quarto plate, on which was figured a unique skull of *Hybodus Delabechii* in the possession of the Society, and another plate will be kindly presented by Mr. Reed to illustrate the present issue.

A considerable amount of re-labelling has been done during the year, particularly among the Inferior Oolite and Palæozoic Fossils.

ANTIQUARIAN DEPARTMENT.—The most interesting gift that has been made to the Antiquarian Department of the Museum during the past year, has been a set of three drawings of St. Mary's Abbey made by the late Mr. Samuel Sharp, and presented by his daughter.

These drawings won for Mr. Sharp the Medal of the Society of Arts. To us they are of remarkable interest. They bring before us the Great Abbey as it existed, in the opinion of the draughtsman, prior to the Dissolution of the Monasteries, and although some of the restorations are, no doubt, conjectural, they are still very clever suggestions not inconsiderately made, and deserving of the most careful attention. No one who looks upon them can help regretting that so glorious a specimen of the Decorated style of Architecture should have been almost entirely destroyed.

The Antiquarian Collections, generally, have made steady progress during the past year, and are becoming so large and choice that they are attracting considerable attention both in this country and abroad. Our great aim must be to make them thoroughly representative of this City and neighbourhood. It is very much to be regretted that no adequate attention was paid to this very important subject at a much earlier period.

MINERALOGY.—The Society has received specimens of Minerals during the past year from the Rev. C. R. Scholfield, Major Barstow, and the Rev. H. Lowther Clarke.

It was stated in the Report of the Council for 1888, that the Collection of Shells hitherto kept in the Mineralogical Room, would be shortly removed to another place. This has at length been done, and the Case which formerly contained the Shells has been fitted up for the reception of the Rock collection, which is now in process of arrangement.

CONCHOLOGY.—The year 1889 has been an important one in the history of the Conchological Department. A wish long cherished by the Honorary Curator has been at last fulfilled, in the provision of suitable accommodation for the general collection of Shells.

Through the liberality of Mr. Wm. Reed, a series of hanging cases has been placed in the gallery of the Tertiary Room, where the Recent Shells can be exhibited in a good light and in their proper sequence.

The Honorary Curator has been busy removing the Shells into their new quarters, and re-arranging the whole collection. The Classification followed is that put forward by the American Conchologist, Tryon. It is the most modern and the most scientific, and will consequently be very generally adopted, though certain to shock the nerves of some veteran Conchologists.

A large quantity of Shells, formerly hidden away in the Cabinets of the Society, is now exhibited, and many new specimens have been added during the year by the Honorary Curator, and by Mr. Wm. Reed, but there still exist some gaps in important groups. The Collection will not attain a proper character, nor rise to the level of the other Departments of the Museum, unless a small annual sum is regularly expended in filling gaps and strengthening weak points. The Honorary Curator is particularly anxious to get rid of all unlocalized examples, as he feels strongly that no specimen is much more than an "airy nothing" unless it has a "local habitation" as well as a name. He is also anxious that Malacology (or the study of the soft parts of Testaceous Animals) should receive some attention. This would be best secured by placing sketches of the Animals by the side of the Shells, and he would be very grateful if any Lady Artist would undertake, either to copy the admirable figures of Forbes and Hanley, or make original sketches.

Conchology has become of late years such a very popular study that no first-class Museum ought to be satisfied with a Collection which is incomplete, either in specimens or arrangement.

COMPARATIVE ANATOMY.—The Honorary Curator reports that the Collection is in good order. During the latter part of the year, the bones of a cow were obtained; these, it is hoped, will shortly be articulated, and they will then help to remedy that deficiency in the commoner types which at present impairs the usefulness of our Collection.

ORNITHOLOGY.—For the Ornithological Department, its Curator reports that the work of renovation in the British Birds' Collection still progresses satisfactorily.

Several new cases have been placed in the Strickland Gallery, many of the specimens contained being new to the Collection.

Among those re-cased are the Great Auks which now stand side by side each in a case to itself.

A number of presentations have been made, of which a detailed list will be found elsewhere in the Report; but of these must here be named a fine Emu. This bird had been kept in confinement by Mr. Naylor, of Leighton Hall, Welshpool, and was by him kindly presented to the Museum. It has been capitally mounted by Mr. E. Allen, of York, and will make a valuable addition to the Foreign collection.

A magnificent series of New Guinea Birds' Skins, 47 in number, has also been presented by Mr. Basil H. Thomson, son of our President, His Grace the Archbishop of York, all of which were collected by himself in the Louisiade and d'Entrecasteaux Islands. This collection contains 33 species, 8 of which are new to science! viz:—

Cracticus Louisiadiensis.

Manucodia Thomsoni.

Dicæum nitidus.

Cinnyris (Hermotinia).

Chibia propinqua.

Tanysiptera rosseliana.

Minox rosseliana.

Macropygia cinereiceps.

A large number of eggs has also been added to our already fine series, most of them in clutches. The majority of the smaller British Birds' Eggs are now represented and the Collection has been greatly improved.

BOTANY.—The British and Foreign Herbaria are in a good state of preservation.

The following flowering plants have been presented by James Melrose, Esq., viz:—3 *Deutzia crenata*. Some specimens of *Lathyrus sylvestris* by Mr. C. F. Hope; also 3 Bulrush Caterpillars (*Sphaeria Robertsii*) by Mr. J. Walker, Esq.

The Curator ventures to express a hope that, at some future time, space may be found for the exhibition of such botanical specimens as possess a general interest.

METEOROLOGY.—*Temperature*.—After three unusually cold years, 1889 has nearly reached the average. The mean of the 9 a.m. and 9 p.m. records was 47·4; that of the maxima and minima 48·55.

February was again the coldest month, the thermometer falling to 21° on the 10th; but the mean for December, 36·7°, was only 0·1 higher. June, which nearly always ranks after July and August, was by far the hottest, averaging 59·1°, or 5·3° warmer than last year,* and warmer than any June since 1869; but on no day in the year did the temperature reach 80°.

Bright Sunshine.—The total, 1144 hours, was less than any of our 9 years, except 1885. June alone was a sunny month, the 238 hours representing 47% of the total amount possible. This has only been exceeded in May, 1881 and 1882, when the respective records were 54% and 55%. In both January and February some 8 hours above the average were recorded, but even then the respective amounts only reach 1 and 2 hours per day.

Rain, falling on 178 days, which was fewer than usual, gave a total depth of 23·40 inches, against 24·69, on a 69 years' mean. On May 10th, 1·51 inches fell, or more than double the total fall in November.

Floods. Only on October 24th (10ft. 3in.) was more than 7ft. registered.

The Barometer had a slightly greater range than last year. The high means in November and December exceed by half an inch the low value for October. The only serious storm

* The mean for June and July, last year, should have been given 54·6°, which is 0·2° instead of 1·2°, lower than in 1871.

was that of October 7th, when great damage was done to Holyhead Pier. Here the wind was sufficient to tear off large limbs from trees, and raindrops drying on the windows left a deposit of salt. [The same, we may notice, occurred on January 19th, 1890, when the storms were again very violent in the Irish Sea.]

AURORAS were noticed on November 26th and 27th. This coincides with the slight increase in the number of Sun spots, which appear to have now passed their minimum.

Henry Richardson, Esquire, has again kindly supplied additional returns from Cherry Hill; and Richard Thompson, Esquire, from Oswaldkirk, has also done so. There is less difference, this year, in the amount of bright sunshine. It is curious that, though the *total* is less, the *percentage* is more. This is because the number of hours recorded in the months with shortest days, December and January, is so much larger, whilst those in June and July happen to be proportionately less. A similar difference also occurred last year.

LIBRARY.—The Library has received a good many additions during the past year, these additions consisting mainly of the publications of various British, Colonial, and Foreign scientific societies, presented by the respective societies.

Mr. Reed continues to add to the Reed Reference Library; amongst his donations during the past year are vols. XXVIII. to XXXII. of the “Challenger Reports.”

In last year’s report, the Honorary Curator pointed out the urgent and increasing need for extension of accommodation. To meet this need, the Rev John Hey kindly undertook to re-arrange the books so as to make the most of the space at present at our disposal. Through his careful management, a considerable economy of space has been effected. But the question of extension will be forced upon us at no very distant date.

PHOTOGRAPHIC SECTION.—This Section now numbers thirty-eight members.

Meetings have been held monthly during the year at which the attendance has been satisfactory; papers on technical subjects

being read by the members, and many objects of photographic interest exhibited.

The Society possesses a suitable and well-appointed developing room, as well as an optical lantern adapted equally for the illustration of general lectures in the theatre of the Museum, and of papers read before the Photographic Section, as well as for the production of enlargements by individual members from their own negatives.

The Sectional Committee has reason to believe that the papers and demonstrations have been appreciated by the members attending the meetings, and have given valuable aid to those inexperienced in the practice of photography.

At the Soiree, held in April, the members exhibited a very creditable collection of prints in the Council Room of the Museum, at which the various modern processes of photographic printing were represented, and an exhibition of lantern slides was also given in the theatre.

The opening address of the winter session was delivered by the President of the Section, Dr. T. Anderson, in the theatre, on the 14th November, and was thrown open to the members of the Society in general. There was a crowded audience. The subject, "Notes on a Photographic Tour in Norway," was illustrated by lantern views prepared from negatives taken by the lecturer chiefly during the past summer; the camera and other photographic apparatus used on the tour were also exhibited, and many valuable practical hints were given as to the best methods of packing and transporting photographic plates when on a journey.

On this occasion was also exhibited a small but choice collection of photographs, by various processes, the production of members of the section.

43 New Members, 1 Life Member, 1 Temporary Subscriber, 6 Lady Subscribers, and 4 Associates have been added to the Society's List during the past year, while 8 Members and 1 Lady Subscriber have been lost by death. 30 Members, 5 Lady Subscribers, and 4 Associates have resigned during the past year.

The Council recommend for election as New Members of Council :—

Major Barstow,
Rev. W. C. Hey,
Mr. F. L. Mawdesley,
Mr. J. E. Clarke,

in the room of Mr. Backhouse, Jun., Mr. Buckle, Mr. Cussons, and Mr. G. S. Gibb, who retire by rotation.

The Council also recommend for election as Honorary Members :—

The Rev. F. O. Morris, B.A., Rector of Nunburnholme, The Rev. Canon Barnes-Lawrence, M.A., Rector of Birkin, and Horace Bolingbroke Woodward, Esq, F.G.S., author of
“Geology of England and Wales.”

HEIGHT OF THE RIVER OUSE DURING 1889.

Date.	Ft.	In.	Date.	Ft.	In.	Date	Ft.	In.
Jan. 1st	0	7	Mar. 6th	0	4	May 9th	1	0
" 2nd	0	10	" 7th	Water off.		" 10th	0	11
" 3rd	1	7	" 8th	1	2	" 11th	1	11
" 4th	1	4	" 9th	1	4	" 12th	3	11
" 5th	0	6	" 10th	2	10	" 13th	1	6
" 6th	0	9	" 11th	1	6	" 14th	1	5
" 7th	0	10	" 12th	0	10	" 15th	1	0
" 8th	0	9	" 13th	1	6	" 16th	1	1
" 9th	0	11	" 14th	2	7	" 17th	0	11
" 10th	1	7	" 15th	1	6	" 18th	0	7
" 11th	2	4	" 16th	S.L.		" 19th	0	7
" 12th	1	6	" 17th	Water off.		" 20th	0	7
" 13th	0	7	" 18th			" 21st	1	0
" 14th	0	6	" 19th	1	3	" 22nd	0	7
" 15th	1	6	" 20th	1	6	" 23rd	0	11
" 16th	0	11	" 21st	6	6	" 24th	1	0
" 17th	0	11	" 22nd	4	9	" 25th	1	2
" 18th	0	7	" 23rd	3	0	" 26th	0	6
" 19th	1	6	" 24th	3	9	" 27th	0	11
" 20th	0	10	" 25th	3	6	" 28th	0	11
" 21st	0	9 $\frac{1}{2}$	" 26th	3	3	" 29th	0	11
" 22nd	0	4	" 27th	1	6	" 30th	1	1
" 23rd	0	11	" 28th	1	2	" 31st	0	10
" 24th	0	10	" 29th	1	0	June 1st	1	6
" 25th	0	7	" 30th	0	10	" 2nd	0	7
" 26th	0	6	" 31st	0	10	" 3rd	1	4
" 27th	0	7	April 1st	0	8	" 4th	0	11
" 28th	0	7	" 2nd	0	7	" 5th	0	7
" 29th	0	7	" 3rd	0	7	" 6th	1	0
" 30th	2	1 $\frac{1}{2}$	" 4th	0	7	" 7th	1	0
" 31st	3	6	" 5th	1	6	" 8th	1	0
Feb. 1st	1	11	" 6th	3	6	" 9th	1	0
" 2nd	2	11 $\frac{1}{2}$	" 7th	2	1	" 10th	1	0
" 3rd	1	0	" 8th	5	6	" 11th	1	0
" 4th	2	5	" 9th	3	3	" 12th	0	6
" 5th	1	1	" 10th	1	4	" 13th	0	6
" 6th	0	10	" 11th	0	6	" 14th	0	6
" 7th	0	10 $\frac{1}{2}$	" 12th	2	3	" 15th	0	6
" 8th	0	7	" 13th	3	6	" 16th	0	6
" 9th	3	5	" 14th	1	7	" 17th	0	6
" 10th	0	11	" 15th	0	6	" 18th	0	6
" 11th	1	4	" 16th	Water off.		" 19th	0	6
" 12th	1	0	" 17th			" 20th	0	5
" 13th	1	0	" 18th	1	4	" 21st	0	5
" 14th	1	5	" 19th	0	6	" 22nd	0	6
" 15th	4	0	" 20th	0	11	" 23rd	0	5
" 16th	1	6	" 21st	0	6	" 24th	0	5
" 17th	1	4	" 22nd	0	6	" 25th	0	7
" 18th	1	11	" 23rd	1	2	" 26th	0	6
" 19th	1	6	" 24th	1	3	" 27th	0	6
" 20th	0	11	" 25th	0	6	" 28th	0	6
" 21st	0	7	" 26th	1	5	" 29th	0	6
" 22nd	0	6	" 27th	1	1	" 30th	0	6
" 23rd	0	11	" 28th	1	1	July 1st	0	6
" 24th	0	10	" 29th	1	1	" 2nd	0	6
" 25th	0	10	" 30th	0	11	" 3rd	0	6
" 26th	0	7	May 1st	1	6	" 4th	0	5
" 27th	0	7	" 2nd	1	5	" 5th	0	5
" 28th	0	7	" 3rd	1	3	" 6th	0	5
Mar. 1st	0	6	" 4th	0	7	" 7th	0	6
" 2nd	0	6	" 5th	0	6	" 8th	0	6
" 3rd	0	6	" 6th	0	6	" 9th	0	6
" 4th	0	6	" 7th	0	11	" 10th	0	6
" 5th	0	6	" 8th	1	0	" 11th	0	6

HEIGHT OF RIVER OUSE DURING 1889 (*Continued*).

Date.		Ft. In.		Date.		Ft. In.		Date.		Ft. In.				
July	12th	.	0	6	Sept.	6th	.	0	4	Nov.	8th	.	1	2
"	13th	.	0	5	"	7th	.	0	4	"	9th	.	1	2
"	14th	.	0	6	"	8th	.	0	6	"	10th	.	1	2
"	15th	.	0	6	"	9th	} Water off.		"	11th	.	0	10	
"	16th	.	0	4	"	10th			"	12th	.	0	6	
"	17th	.	0	4	"	11th			"	13th	.	1	2	
"	18th	.	0	4	Summer Level from 12th				"	14th	.	1	2	
"	19th	.	0	5	to 20th.				"	15th	.	1	0	
"	20th	.	0	5	"	21st	.	0	6	"	16th	.	1	3
"	21st	.	0	5	"	22nd	.	0	7	"	17th	.	1	0
"	22nd	} Water off.			"	23rd	.	0	7	"	18th	.	1	3
"	23rd				"	24th	.	0	5	"	19th	.	1	3
"	24th	.	0	5	"	25th	.	0	5	"	20th	.	1	2
"	25th	.	0	7	"	26th	.	0	4	"	21st	.	1	1
"	26th	.	1	1	"	27th	.	0	3	"	22nd	.	1	0
"	27th	.	0	7	"	28th	.	1	0	"	23rd	.	0	6
"	28th	.	0	7	"	29th	.	0	4	"	24th	.	1	0
"	29th	} Water off.			"	30th	.	0	4	"	25th	.	1	0
"	30th				Oct.	1st	.	0	7	"	26th	.	1	3
"	31st	.	0	5	"	2nd	.	0	7	"	27th	.	0	10
Aug.	1st	.	0	5	"	3rd	.	0	3	"	28th	.	0	8
"	2nd	.	0	5	"	4th	.	0	3	"	29th	.	0	7
"	3rd	.	0	5	"	5th	.	0	6	"	30th	.	0	6
"	4th	.	0	6	"	6th	.	0	6	Dec.	1st	.	0	8
"	5th	.	1	0	"	7th	.	0	8	"	2nd	.	0	8
"	6th	.	1	1	"	8th	.	3	10	"	3rd	.	0	8
"	7th	.	1	3	"	9th	.	1	11	"	4th	.	0	6
"	8th	.	4	7	"	10th	.	3	0	"	5th	.	0	6
"	9th	.	1	2	"	11th	.	2	0	"	6th	.	0	8
"	10th	.	0	10	"	12th	.	1	2	"	7th	.	0	6
"	11th	.	0	6	"	13th	.	0	6	"	8th	.	0	9
"	12th	.	0	11	"	14th	.	0	6	"	9th	.	1	8
"	13th	.	0	11	"	15th	.	0	6	"	10th	.	2	10
"	14th	.	0	7	"	16th	.	0	7	"	11th	.	1	8
"	15th	.	1	0	"	17th	.	1	2	"	12th	.	1	0
"	16th	.	1	1	"	18th	.	1	0	"	13th	.	1	0
"	17th	.	0	6	"	19th	.	1	1	"	14th	.	1	6
"	18th	.	1	3	"	20th	Water off.		"	15th	.	0	7	
"	19th	.	0	6	"	21st	.	5	0	"	16th	.	1	0
"	20th	.	0	6	"	22nd	.	4	2	"	17th	.	1	0
"	21st	.	2	0	"	23rd	.	7	2	"	18th	Water off.		
"	22nd	.	1	3	"	24th	.	10	3	"	19th	.	1	6
"	23rd	.	0	8	"	25th	.	7	6	"	20th	.	1	5
"	24th	.	1	0	"	26th	.	3	10	"	21st	.	1	8
"	25th	.	0	10	"	27th	.	1	9	"	22nd	.	0	8
"	26th	.	0	10	"	28th	.	3	0	"	23rd	.	2	11
"	27th	.	1	0	"	29th	.	2	6	"	24th	.	2	1
"	28th	.	0	7	"	30th	.	1	3	"	25th	.	2	6
"	29th	.	0	6	"	31st	.	1	2	"	26th	.	1	6
"	30th	.	0	6	Nov.	1st	.	1	2	"	27th	.	1	2
"	31st	.	0	6	"	2nd	.	3	11	"	28th	.	1	0
Sept.	1st	.	0	6	"	3rd	.	2	6	"	29th	} Water off.		
"	2nd	.	0	6	"	4th	.	2	11	"	30th			
"	3rd	.	0	6	"	5th	.	2	2	"	31st			
"	4th	.	0	4	"	6th	.	1	6					
"	5th	.	0	4	"	7th	.	1	4					

The River was at or below Summer Level on 10 days, and 6 inches or less above Summer Level on 103 days during the year.

STATION, YORK.—THE MUSEUM.

Longitude 1° 5' W., Latitude 53° 57' N. Height above Mean Sea Level 51 feet.

1889.	Highest Barometer.	Lowest Barometer.	Mean Pressure.	Air Temperature.							Tension of Vapour.			Relative Humidity				
				9 a.m.	9 p.m	Mean.	Means of		Absolute Min. and Max.		9 a.m.	9 p.m.	Mean.	9 a.m.	9 p.m.	Mean		
							Min.	Max.	Min.	Date.							Max.	Date.
January	3rd, 9 a.m. 30·665	9th, 9 p.m. 29·277	ins. 30·099	° 37·0	° 37·8	° 37·4	° 32·4	° 43·2	° 23·0	° 6th	° 54·8	18th	in. ·206	in. ·208	in. ·207	% 94	% 92	% 93
February	23rd, 9 p.m. 349	3rd, 9 a.m. 29·058	29·840	37·1	36·3	36·7	31·7	42·8	21·0	10th	55·0	1st	·188	·185	·187	85	86	86
March	15th, 9 a.m. 546	20th, 8 a.m. 28·755	·919	39·9	39·7	39·8	33·9	47·1	23·0	{ 3rd 4th	61·0	29th	·208	·212	·210	85	87	86
April	19th, 9 a.m. 083	4th, 9 a.m. 29·175	·710	45·3	43·8	44·6	38·3	51·2	32·0	15th	64·0	18th	·243	·245	·244	80	85	83
May	21st, 9 a.m. 108	24th, 9 p.m. 476	29·808	54·5	53·4	54·0	46·8	64·0	41·0	3rd	77·2	22nd	·350	·356	·353	82	88	85
June	5th, 9 a.m. 437	2nd, 6 p.m. 604	30·054	60·9	57·3	59·1	50·7	70·9	46·3	11th	79·0	27th	·392	·385	·389	74	81	78
July	1st, 9 p.m. 441	25th, 9 a.m. 417	29·911	60·0	57·1	58·6	50·4	67·9	42·0	8th	79·0	31st	·374	·387	·381	72	82	77
August	31st, 9 p.m. 241	20th, 9 a.m. 120	29·809	58·7	57·1	57·9	51·2	65·9	43·0	25th	73·0	1st	·392	·398	·395	80	85	83
September	15th, 9 p.m. 467	20th, 9 p.m. 29·517	30·033	54·5	52·6	53·6	47·0	61·6	33·0	22nd	73·0	10th	·347	·335	·341	81	84	83
October	25th, 9 p.m. 339	7th, 9 a.m. 28·841	29·681	47·0	47·2	47·1	41·9	53·2	34·0	11th	57·0	{ 2nd 10th	·291	·295	·293	91	92	92
November	17th, 9 a.m. 679	25th, 8 a.m. 29·304	30·169	42·7	43·6	43·2	37·9	48·7	27·0	{ 13th 27th	60·0	10th	·252	·252	·252	92	89	91
December	5th, 9 p.m. 30·731	10th, 9 p.m. 29·155	30·127	36·9	36·7	36·8	31·6	41·7	25·0	14th	54·0	18th	·200	·195	·198	92	90	91
Year	Dec. 5th, 30·731*	Mar. 20th, 28·755*	29·930	47·9	46·9	47·4	41·2	54·9	21·0	Feb.	79·0	June. July.	·287	·288	·288	84·0	86·8	85·4

* The recording barometer indicated that the actual extremes were, respectively, 30·74 about Mid-night and 28·73 at 6 a.m.

STATION, YORK.—THE MUSEUM.

Thermometers 4 feet 3 inches above ground. Rain-gauge 1 foot 9 inches above ground.

1889.	Amount of Cloud.			Rainfall.			Weather, No. of Days of							Wind, No. of Observations of							Sunshine Returns.				
	9 a.m.	9 p.m.	Mean	Total.	Max.	Day	Rain	Snow	Hail	Thun- der Storms	Clear Sky	Over- cast	Gale	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm	Total hours.	Per. centage 1889	Per centage 1888.
January	7.5	6.3	6.9	ins. 1.24	.58	9th	12	0	0	0	3	14	0	7	4	3	7	16	6	11	3	5	31	13	10
February	6.8	5.7	6.3	1.03	.16	3rd	18	12	0	0	2	9	1	12	5	4	0	3	4	21	7	0	60	22	23
March	7.4	6.2	6.8	2.29	1.10	8th	13	5	0	0	2	13	0	12	6	4	2	8	6	21	3	0	94	26	27
April	7.5	8.1	7.8	1.57	.23	7th	19	0	0	3	1	18	0	10	7	17	2	7	4	11	2	0	97?	23?	23
May	7.5	5.6	6.6	3.68	1.51	10th	16	0	1	6	2	10	0	7	9	14	9	16	1	1	3	2	134	27	45
June	4.8	4.2	4.5	0.40	.26	8th	4	0	0	0	6	3	0	10	12	11	5	9	3	9	1	0	238	47	28
July	6.0	6.3	6.2	1.42	.36	10th	13	0	1	3	2	9	0	8	7	8	4	6	5	22	2	0	164	32	21
August	7.0	7.5	7.3	4.49	.49	19th	20	0	1	2	4	13	0	2	2	3	5	8	7	28	6	1	114	25	28
September	5.7	3.3	4.5	0.95	.33	23rd	12	0	0	0	9	5	0	11	6	10	1	10	3	11	8	0	103	27	28
October	8.5	7.1	7.8	4.14	.62	11th	23	0	1	1	1	16	0	14	8	6	5	14	5	6	4	0	46	14	29
November	7.9	6.6	7.3	0.72	.19	14th	13	2	0	0	2	15	0	4	2	2	9	15	4	18	4	2	42	17	17
December	7.0	7.1	7.1	1.47	.57	6th	15	1	0	0	0	13	0	8	1	3	8	22	7	7	6	0	21	9	14
Year	7.0	6.2	6.6	23.40	1.51	May.	178	20	4	15	34	138	1	105	69	85	57	134	55	166	49	10	1144	23.5	24.4

BRIGHT SUNSHINE VALUES.

YEAR.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		MAY.		JUNE.		JULY.		AUGUST.		SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.		WHOLE YEAR.	
	Per Cent.		Per Cent.		Per Cent.		Per Cent.		Per Cent.		Per Cent.		Per Cent.		Per Cent.		Per Cent.		Per Cent.		Per Cent.		Per Cent.		Total.	
	Hours	Total.	Hours	Total.	Hours	Total.	Hours	Total.	Hours	Total.	Hours	Total.	Hours	Total.	Hours	Total.	Hours	Total.	Hours	Total.	Hours	Total.	Hours	Total.	Hours	Total.
1881.	36	15	36	13	107	29	143	34	272	54	155	31	174	35	137	33	78	21	96	30	44	18	27	12	1305	30
1882.	31	13	47	17	115	31	138	33	273	55	179	36	172	34	180	40	99	27	70	22	51	20	15	7	1370	31
1883.	22	9	71	26	133	36	135	32	201	40	170	34	154	31	164	36	100	27	94	29	48	19	29	13	1321	30
1884.	24	10	34	12	87	23	126	30	210	42	175	35	143	29	193	42	115	31	96	30	34	14	6	3	1243	28
1885.	3	1	29	11	69	19	87	21	161	33	168	33	170	34	61	13	139	37	64	20	17	7	12	5	980	22
1886.	17	7	47	18	82	23	132	32	97	20	152	30	162	32	151	33	106	28	63	20	68	27	70	31	1147	26
1887.	31	13	96	36	110	30	182	44	111	23	205	41	209	41	194	43	84	22	92	29	30	12	33	15	1377	29
1888.	25	10	65	23	97	27	97	23	222	45	141	28	165	21	125	28	106	28	93	29	42	17	31	14	1149	24
1889.	31	13	60	22	94	26	97	23	134	27	238	47	164	32	114	25	103	27	46	14	42	17	21	9	1144	23.5
Totals	220		488		896		1137		1681		1583		1453		1319		930		712		376		244		11036	
means.	24½	10½	54	20	99½	27	126½	30	187	37½	176	35	161	33	136½	32	103½	28	79	24½	42	17	27	12	1226	27.1

SUPPLEMENTARY RETURNS,
 SUPPLIED BY
 H. RICHARDSON, ESQ., AND R. THOMPSON, ESQ.

CHERRY HILL, YORK.					RAINFALL AND SUNSHINE TAKEN AT OSWALDKIRK.			
Month.	1889. Monthly Totals.	Number of days on which rain or snow fell.	York average for past 40 years. 1849-89.	1889. Monthly excess or deficiency.	Rainfall.	Total No. of hours of bright sunshine.	Percentage of actual sun- shine to "possible."	Month.
	Inches.			Inches.				
Jan.	1·19	11	1·68	— ·49	1·32	37·06	15·37	Jan.
Feb.	1·11	17	1·56	— ·45	1·21	60·45	22·64	Feb.
Mar.	2·18	12	1·65	+ ·53	2·63	96·00	26·37	Mar.
April	1·41	18	1·63	— ·22	1·66	82·75	19·79	April
May	3·63	13	1·94	+ 1·69	3·18	143·61	29·19	May
June	0·37	4	2·00	— 1·63	·24	225·15	44·49	June
July	1·44	14	2·76	— 1·32	2·61	147·85	29·21	July
Aug.	4·95	21	2·36	+ 2·59	5·56	102·38	22·50	Aug.
Sept.	1·01	13	1·98	— ·97	·81	100·82	26·95	Sept.
Oct.	3·87	22	2·67	+ 1·20	4·32	40·73	12·72	Oct.
Nov.	0·71	10	2·00	— 1·29	·87	44·92	18·04	Nov.
Dec.	1·50	16	1·96	— ·46	1·88	38·20	17·20	Dec.
Totals	23·37	171	24·19	— ·82	26·29	1119·92	23·70 Approximate.	

LECTURES.

The following Evening Lectures have been delivered in the Theatre of the Museum and Festival Concert Room :—

IN THE MUSEUM :

- Feb. 28th. On “The Volcanoes of Sicily and the Lipari Islands.”
By DR. TEMPEST ANDERSON, M.D., B.Sc.
- Nov. 14th. “Photographic Notes on a Tour in Norway.” By
DR. TEMPEST ANDERSON, M.D., B.Sc.

IN THE CONCERT ROOM :

- Jan. 9th. On “Subterranean Ice.” By the REV. PROFESSOR G.
F. BROWNE, B.D.
- Jan. 30th. On “Dante.” By the LORD BISHOP OF RIPON.
- Feb. 15th. On “The Life of a Yorkshire Stream.” By PROFESSOR
L. C. MIALL.
- March 5th. On “Spectrum Analysis.” By PROFESSOR SMITHELLS.
- Nov. 8th. On “Colours of Animals.” By ALFRED RUSSELL
WALLACE, F.L.S., F.R.G.S.
- Nov. 21st. On “The Migration of Birds.” By HENRY SEEBOHM,
F.R.S., F.L.S.
- Nov. 28th. On “Animal Locomotion.” By EADWEARD MUYBRIDGE,
Esq.
- Dec. 5th. On “The Mammoth and its lessons.” By H. H.
HOWORTH, M.P., F.S.A.

The following papers were read :

- “On two groups of the Cretaceous Selachian Fish
Ptychodus.” By A. SMITH WOODWARD, F.G.S.
- “On the Tooth of a Carboniferous Dipnoan Fish,
Ctenodus interruptus.” By A. SMITH WOODWARD,
F.G.S.

NEW MEMBERS ELECTED.

- Allen, Edward, *Feasegate*.
 Allenby, Major, 31, *St. Mary's*.
 Allison, William, *Church Street*.
 Bellerby, John, 45, *Petergate*.
 Beresford, Claudius de la Poer, R.E., 78, *Bootham*.
 Carr, John P., *The Bank, Coney Street*.
 Chapman, Henry, *High Ousegate*.
 Dalton, S. J., *Skeldergate*.
 Davies, Rev. J. J., 27, *St. Saviourgate*.
 Dickenson, Mrs. J. Y., 1, *Bootham*.
 Dyson, H., *Scawin's Hotel*.
 Ellison, W. S., 13, *St. Mary's*.
 Empson, Henry William, 40, *Blossom Street*.
 Fletcher, Mrs., 6, *Lord Mayor's Walk*.
 Forrest, Miss, *The County Hospital*.
 Gray, Joseph S., *Mill View, Holgate*.
 Hammick, Sir St. Vincent, Bart., *Marygate*.
 Hartley, Mrs., *Sycamore Cottage, Clifton*.
 Hope, Charles F., F.C.S., *Grosvenor Terrace*.
 Hurst, Arthur, *Inglecroft, Nunthorpe Avenue*.
 Johnson, R. J., 3, *Minster Court*.
 Kitching, J. N., *Heworth*.
 Lamb, George, *Colliergate*.
 Lindberg, Captain, *Clifton*.
 McKay, William, *White Cross Lodge, Haxby Road*.
 McLeod, Lieut.-Colonel, 53, *Bootham*.
 Mitchell, Oswald, 22, *Blake Street*.
 Mosley, George, F.G.S., *Holgate*.
 Oakes, Sir Reginald, Bart., *Holgate*.
 Oglesby, J. John, 7, *Museum Street*.
 Sawray, Mrs., 6, *Driffeld Terrace*.
 Taylor, H. Dennis, 20, *Bootham Terrace*.
 Turner, A. W., *The School of Art*.
 Tute, A. C., 29, *St. Mary's*.
 Varvill, Michael, *St. Mary's*.
 Waind, Frederick, 19, *High Ousegate*.
 Ware, John Tatham, 6, *New Street*.
 Watkins, Major F. W., *Station Hotel*.
 Wilberforce, W. W., *Millfield House*.
 Worsley, Arthington, *Lendal*.

Wright, Charles Edward Leigh, *Dringhouses Manor*.

Wright, Orlando, *Blake Street*.

Young, Rev. J. E. M., *St. Saviourgate*.

LIFE MEMBER.

Barstow, Mrs., *Hazelbush*.

Glaisby, Walter, *St. Leonard's Place*.

LADY SUBSCRIBERS.

Cross, Mrs., 12, *Burton Lane*.

Deighton, Mrs. J. H., 32, *The Mount*.

Egerton, Miss, *Whitwell*.

Holmes, Mrs., 12, *Grosvenor Terrace*.

Hornby, Mrs., *Club Chambers*.

Jewitt, Miss M. A., *Petergate*.

Kemp, Miss Elizabeth, 12, *St. Mary's*.

Turner, Miss M., *Fishergate Villa*.

ASSOCIATES.

Baker, George, *Nunthorpe Avenue*.

Jones, G. Fowler, *Lendal*.

Kelly-Kenny, Colonel T., *Duncombe Street*.

Stevenson, Arthur Gavin, *Nunthorpe Road*.

TEMPORARY SUBSCRIBER.

Harley, Major, 17, *St. Mary's*.

THE TREASURERIN ACCOUNT WITH THE YORKSHIRE PHILOSOPHICAL SOCIETY FOR THE YEAR ENDING 31ST DECEMBER, 1889.

Dr.	INCOME.		EXPENDITURE.		Cr.
	£.	s. d.	£.	s. d.	
<i>Subscriptions:</i>					
Members	662	0 0	Crown Rent	1	0 0
County Members	28	0 0	Corporation Rent	19	10 0
Temporary Members ..	1	0 0	<i>Rates and Taxes:</i>		
Lady Subscribers	60	0 0	Poor Rates, Income Tax,		
Associates.....	19	0 0	&c., St. Wilfrid and St.		
Arrears	2	5 0	Olave	22	0 9
Compositions in lieu			Waterworks Company	5	2 11
of future Subscrip-			Gardeners' Licenses	2	5 0
tions	20	0 0	Stamping Receipt Book ..	1	9 2
Keys of Gates	53	15 0			30 17 10
		846 0 0	Insurance	5	7 0
<i>Rents:</i>			<i>Salaries and Wages:</i>		
T. G. Mann, Esq., St-			Mr. Platnauer	200	0 0
Mary's Lodge	50	0 0	Mr. Fielden	60	0 0
Mr. Sykes, Bootham and			Miss Baines	39	0 0
Marygate Towers	24	9 0	Mr. Guy	25	0 0
Mr. Burton, Marygate			Jas. Davison (Pension) ..	26	0 0
Baths, (part Arrears			Attendants, Museum and		
for 1888)	25	0 0	Hospitium:		
York Amateur Boating			Attendant at Mu-		
Club	5	0 0	seum.....	57	4 0
Fine Art Society	2	0 0	Female attendant		
York and District Field			at Museum....	31	4 0
Naturalists' Society,			Female attendant		
less £1 paid to Attend-			at Hospitium..	29	15 0
ant	2	0 0			118 3 0
Water Works Company	0	1 0	Gardeners, including Sun-		
		108 1 0	day attendance at Gate..	84	6 6
Hire of Tent and Tables..	19	17 6			552 9 6
Less Carriage, Attendant			Yorkshire Insurance Company—		
fixing and removing			Annuity	198	3 8
when on Hire, &c. ..	4	3 6	Commission to Bankers less Interest	3	8 6
		15 14 0	<i>General Repairs, Expenses, and Additions,</i>		
Meteorological Department		15 12 0	Museum and Hospitium..	119	7 3
Sale of Plants and Flowers.....		1 8 6	Estate	77	3 2
Whitsuntide Admission			Gardens.....	9	19 4
Fees	11	17 11			206 9 9
Less:			<i>Library:</i>		
Attendants and			Books, Binding, &c.....	23	12 5
Police	6	10 0	<i>Lectures and Conversazione:</i>		
Joiner Fixing			Expenses in con-		
Barricades ..	0	8 3	nection with		
		6 18 3	lectures in 1888	39	19 0
		4 19 8	Ditto, in 1889	143	5 10
Gate Money.....	227	7 11			183 4 10
Sale of Catalogues, Photographs, &c.		6 11 0	<i>Less:</i>		
		1225 14 1	Receipts by Ad-		
Excess of Expenditure over Income	31	13 1	missions and		
			Sale of Tickets	87	3 8
			Donations	23	0 0
					110 3 8
					73 1 2
			Expenses of Conversa-		
			zation	13	0 0
			Less Donations	3	0 0
					10 0 0
			<i>Miscellaneous:</i>		
			Printing and Stationery	6	17 11
			Printing Reports and Postage thereof	14	14 5
			Printing Communications to Mem-		
			bers and postages of same	3	18 10
			<i>Coals and Gas:</i>		
			Museum	19	10 6
			Gardens	9	3 11
			Estate	14	1 2
					42 15 7
			Purchases of Antiquities.....	37	9 9
			Meteorology.....	15	12 0
			Sundries, including Firewood,		
			Carriage of Parcels, &c.	5	10 7
			Sundry Postages	6	8 3
					£1257 7 2
					£ s. d.
			Balance in hands of the		
			Treasurer 31st December,		
			1888	31	17 5
			Excess of Expenditure		
			over Income, 1889.....	31	13 1
					£0 4 4

Balance in hands of the Treasurer,
31st December, 1889..... 0 4 4

£1257 7 2

EDWIN GRAY, Hon. Treasurer.

Audited and found correct,

J. A. CUNNINGHAME.

York, 4th February, 1890.

DONATIONS TO THE MUSEUM & LIBRARY.

LIBRARY.

BOOKS PRESENTED.	DONORS.
The Journal of the Chemical Society, vol. lv. and lvi., 1889, and Abstracts..	The Society.
The Records of the Geological Survey of India, vol. xxi., part 4, vol. xxii., parts 1, 2, 3	
A Bibliography of Indian Geology, being a List of Books and Papers relating to the Geology of British India and adjoining Countries, 1889	The Indian Government.
Catalogue of Fossil Fishes, part 1.....	
„ „ Cephalopoda, part 1	The Trustees of the British Museum.
„ „ Chelonians and Croc- odiles, Marsupiala, and Monotremata	
Catalogue of Fossil Reptilia and Amphi- bia, part 2	
Illustrations of the Lepidoptera and Heterocera in the Collections of the British Museum	
The Report of the British Association for the advancement of Science, Bath, 1888	The Association.
The Report of the Smithsonian Institution for 1886, part 1	
The Bulletin of the American Geogra- phical Society, supplement to vol. xx. and vol. xx., part 4, vol. xxi, parts, 1, 2, 3	The Society.
The Transactions of the New York Academy of Sciences, vol. viii, Nos. 1, 2, 3, 4, with reprints	
The Proceedings of the Geologists' Association, vol. xi., Nos. 1, 2, 3, 4, 5	The Association.
The Memoirs and Proceedings of the Manchester Literary and Philosophical Society, vol. ii., 4th series (vol. xxxii. old).....	
	The Society.

BOOKS PRESENTED.	DONORS.
The Monograph of the British Jurassic Gasteropoda, part 1, No. 3 (Inferior Oolite), and reprint from the Geologists' Association, on the Geological History of Iron Ores, by W. H. Hudleston, M.A., F.R.S.	The Author.
The Transactions of the Zoological Society of London, vol. xii., parts 8 and 9 ..	The Society.
The Proceedings of the Leicester Literary and Philosophical Society, parts 10, 11, 12, 1889. Transactions vol. ii., part 1, 1889	The Society.
The Meteorological Observations at Stations of the 2nd order, 1885	The Meteorological Society.
The Report of the International Meteorological Committee, Zurich, September, 1888, 4th Meeting	
The Report of the Meteorological Council to the Royal Society for the year 1888	
The Hourly Readings, parts 1, 2, 3, 4, 1886, Quarterly Weather Reports, new series, parts 4, 5, 1879, and Weekly and Daily Weather Reports	The Institution.
The Proceedings of the Royal Institution of Great Britain, vol. xii., part 2, No. 82	The Society.
The Transactions of the Natural History Society of Northumberland, Durham, and Newcastle-upon-Tyne, vol. viii., part 3, vol. x., part 1	The Society.
The Proceedings of the Bristol Naturalists' Society, new series, vol. vi., part 1	The Society.
The Report and Proceedings of the Belfast Natural History and Philosophical Society, 1888-89	The Society.
The Proceedings of the Warwickshire Naturalists' and Archæologists' Field Club, 33rd Annual Report, 1888	The Society.

BOOKS PRESENTED.	DONORS.
The Papers and Proceedings of the Hampshire Field Club, Nos. 1, 2 The Geological Survey of Minnesota for 1872-73 The Proceedings of the Academy of Natural Sciences of Philadelphia, part 3, 1885, parts 1 and 3, and 18 other pamphlets	W. Whitaker, Esq., B.A.
The Journal of the Liverpool Geological Association, vol. viii., 1887-88	
The Transactions of the Leeds Geological Association, part 4, 1888	
The Calendar of the Yorkshire College, Leeds, for 1889-90	The Association.
The Papers and Proceedings of the Hampshire Field Club, No. 3	The Association.
The Annual Report of the Manchester Microscopical Society, 1888	The College.
The Demands of Darwinism on Credulity, by the Rev. F. O. Morris	The Society.
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Geological Magazine.

Journal of the British Archæological Association.

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The Yorkshire Archæological Journal.

RESOLUTIONS

PASSED AT THE ANNUAL MEETING, HELD FEB. 4TH, 1890.

1. That the Report of the Council now read be adopted and printed for circulation amongst the Members, Lady Subscribers, and Associates of the Society.

2. That the thanks of the Society be given to the Members of the Council retiring from office, also to the Treasurer, Secretary, and Curators, for their valuable services; and that authority be given to the Council to give admission to the Public to the Museum on Whit-Monday and Tuesday, under the same regulations as last year.

3. That the thanks of the Meeting be given to the Chairman.

COMMUNICATIONS
TO THE
MONTHLY MEETINGS
OF THE
YORKSHIRE PHILOSOPHICAL SOCIETY,
1889.

PLATYCHÆROPS RICHARDSONI.

The specimen, of which a view is given in fig. 1 of Plate I., is one of the treasures of the Museum, and is absolutely unique. It was obtained not later than 1854 from the London Clay of Herne Bay, in Kent, and was described in the *British Association Report* for that year, by Mr. E. Charlesworth, under the name of *Platychoerops Richardsoni*; it was again described, with a figure, by Sir Richard Owen, in the *Geological Magazine* for 1865, as *Miolophus planiceps*. The specimen consists of the middle portion of the skull of a small mammal, of about the size of the common fox, which has been considerably flattened by pressure. It shews the anterior part of the skull, the commencement of the zygomatic arches, the frontal region, and a considerable portion of the palate. Five teeth are preserved, namely, the last and penultimate ones on both sides, and on the right side the fourth tooth from the hinder end of the series. These molariform teeth (fig. 1*a*) have flattened crowns, carrying three cusps or tubercles arranged in a triangle, and an internal ledge or cingulum. The outer cusps have their external surface somewhat flattened and inclined inwardly, while the inner cusp is somewhat V-shaped. This type of tooth belongs to that modification which Professor Cope has proposed to call the *tritubercular*—a type very common among the mammals of the early Eocene. In advance of the next anterior tooth now remaining, there were evidently toothless intervals in the jaw, but whether there was a tooth immediately in contact with the first now remaining cannot be determined. So far as can be seen, the bony palate appears to have been prolonged for some distance behind the last tooth.

In his description of the specimen, Sir R. Owen regarded it as indicating a Perissodaetyle Ungulate, allied to *Hyracotherium* of the same beds; but this view is at once negatived by the form of the teeth, which have no sort of resemblance to those of the so-called *Lophodont* type which are found in that genus. The structure of the teeth shows, indeed, that their owner belonged to a generalised group of mammals, which Professor Cope has collectively denominated Bunotheria, and has subdivided into several orders or sub-orders, some of which, like the Creodonta, are most nearly allied to the modern Carnivora, while others, like the Condylarthra, approximate to an Ungulate type, and others again cannot well be included in any existing order. When, however, we have to decide to which of these groups the specimen should be referred, the question becomes very difficult indeed, owing to the imperfect nature of the fossil.

The first suggestion as to its affinity with these primitive types was made in the *Geological Magazine* for 1885, p. 360, where it was suggested that it was generically identical with a form described by Professor Cope under the name of *Esthonyx*; this view, however, was not accepted by the founder of the latter genus. Quite recently, Dr. Schlosser, of Munich, in his work on the Fossil Carnivora, etc., of the Tertiaries of Europe, now in course of publication in the *Beitr. pal. Oëster-Hungar.*, considers that *Platychoerops* should find a place among the Creodont Carnivora.

None of the Creodonts that have come under the writer's notice have, however, molar teeth exactly like those of the specimen under consideration; while those of *Esthonyx*, as figured in Plate xxiv., c, of Professor Cope's magnificent work on the "Tertiary Vertebrata of the West," published by the U.S. Geological Survey of the Territories, are so like those of the English specimen that it is very difficult to believe that the two forms are not nearly related. Unfortunately the absence of the anterior teeth in the type of *Platychoerops* renders it impossible, at present, to be absolutely certain on this point; and the best hope of arriving at a satisfactory conclusion would be to obtain either actual upper molars of *Esthonyx* from America, or, failing those, a cast of the type specimens. Till this be done, the question of the true affinity of the unique fossil of the York Museum must remain undecided.

ON THE TOOTH OF A CARBONIFEROUS
DIPNOAN FISH: *CTENODUS INTERRUPTUS*.

The known remains of the Upper Palæozoic Dipnoan Fish, *Ctenodus*, are all of so fragmentary a nature, that the teeth alone can, at present, be employed for the distinction and definition of the species of the genus. It is thus unfortunate to observe that these teeth not only vary considerably in the different stages of growth of individuals of a single species,* but are also much changed in the appearance of their dental crown by various agencies of post-mortem corrosion and abrasion. According to the latest researches, several supposed "species" owe their distinction merely to causes of this nature, and the table of synonymy is hence somewhat lengthy.† Moreover, a few forms that appear to be correctly regarded as well-marked specific types, are as yet only inadequately defined; and the present note relates to a tooth in the Society's Museum which falls under the latter category. This fossil was obtained from the Carboniferous Limestone Series of Gilmerton, near Edinburgh, and is shown, of the natural size, in Plate I., fig 2; it was briefly noticed by Mr. T. P. Barkas, F.G.S., in 1869,‡ under the name of *Ctenodus interruptus*, and a short diagnosis, without figure, was published later in the same year.§

The tooth is referable to the left side of the lower jaw, and is somewhat broken at the margins, especially in its anterior half. There are indications of fourteen coronal ridges, of which the foremost (x) is broken, bent forward, and much abraded, while the eighth and eleventh appear as intercalated at the outer margin, not extending inwards beyond the middle of the tooth. So far as preserved, each complete ridge is subdivided in its outer half into a series of broad distinct tuberculations, but becomes much laterally compressed in its inner half, and is even or exhibits only few feeble traces of transverse constrictions. The tubercles have the form of large rounded mammillæ, and

* A. Fritsch, "Fauna der Gaskohle, etc., Böhmens," vol. ii. (1888), p. 71, Pl. lxxiii.

† Woodward and Sherborn, "Catalogue of British Fossil Vertebrata" (1890), pp. 51–53.

‡ "Scientific Opinion," vol. i., p. 515.

§ *Ibid.*, vol. ii., p. 113.

the majority are so much compressed that their transverse diameter considerably exceeds their length in the direction of the axes of the ridges to which they belong.

As remarked by Mr. Barkas, the tooth thus described is distinguished from the teeth of the most nearly allied species, *C. cristatus*, by the comparative smoothness of the inner moiety of each ridge, and by the distinct separation of the much compressed denticles. That it is a comparatively constant form of tooth in the Carboniferous Limestone Series of South Scotland, has been pointed out to the present writer by Dr. R. H. Traquair, F.R.S., during a recent visit to Edinburgh; and *Ctenodus interruptus* is doubtless to be regarded as the Lower Carboniferous representative of the well-known *C. cristatus* of the Coal Measures.

A. SMITH WOODWARD.

ON TWO GROUPS OF TEETH OF THE CRETACEOUS SELACHIAN FISH *PTYCHODUS*.

Several discoveries of large groups of teeth of the well-known Cretaceous genus, *Ptychodus*, have already been recorded from the English Chalk; and in the case of one species, *P. decurrens*, the dentition has been found in a sufficiently complete state for satisfactory restoration.* The fact has also been emphasised, that these associated groups of teeth prove the ornamentation of the dental crown to have varied little in different parts of the mouth. Hitherto, however, series of figures of such associated teeth have only been published in the case of *Ptychodus decurrens*, and, to a slight extent also, of *P. multistriatus*† and one variety of *P. polygyrus*.‡ It is thus of interest to be able, through the generosity of William Reed, Esq., F.G.S., to offer a few remarks on two fine groups of teeth of other species or varieties in the Society's Museum, illustrated by the accompanying Plate I., figs. 3—20.

* Smith Woodward, "On the Dentition and Affinities of the Selachian Genus *Ptychodus*," Quart. Journal Geol. Soc., vol. xliii. (1887), p. 123, Pl. x.; also "Synopsis of the Vertebrate Fossils of the English Chalk," Proc. Geol. Assoc., vol. x. (1888), p. 296, woodc.

† Smith Woodward, "Catalogue of Fossil Fishes in the British Museum," pt. i. (1889), p. 146, Pl. v., figs. 4—6.

I. *PTYCHODUS MAMMILLARIS*, Agassiz. (Figs. 3--14.)

An associated series of eighty teeth from the Chalk near Rochester, Kent, is referable to the well-known *P. mammillaris*; and all the principal series of each jaw seem to be represented. None of the teeth are in natural order, and only the median rows can thus be determined with precision. Of the small teeth of the upper median series, there are three examples, and one is shown in fig. 4. This tooth has not previously been described and figured, and on comparison with the corresponding teeth of other species already known, it will be observed that there are well-marked distinctive features. As shown in end view (fig. 4a), the root exhibits the usual great relative depth; the crown is less elongated antero-posteriorly than in *P. decurrens** and *P. latissimus*,† though more so than in *P. polygyrus*‡ and *P. rugosus*;§ and the coronal surface is remarkably smooth, the peripheral area being faintly granulated, and the median raised area being very small, crossed by three short ill-defined ridges. The large median lower tooth is shown in fig. 3; and both this and the unsymmetrical principal lateral teeth (figs. 5—11) exhibit, with remarkable uniformity, all the characteristics of the species,—the much elevated median area, with numerous regular transverse ridges, sharply defined from the large peripheral area, and the latter marked by delicate rugae, mostly elongated and concentric with the borders of the crown, and occasionally crossed by shallow radiating grooves. The tooth represented in fig. 5 is almost certainly referable to the first lateral series of the upper jaw, as indicated by its relatively large size; and the original of fig. 6 may have occupied a similar position in the lower jaw. The outermost lateral teeth (figs. 12—14) are scarcely distinguishable from those of other species; but even in these teeth, the characteristic elevation of the central area is sometimes prominent (fig. 14a).

The finest group of teeth of *Ptychodus mammillaris* hitherto discovered, is now preserved in the Woodwardian Museum,

† W. Buckland, "Geology and Mineralogy, Ed. 2 (1837), Pl. xxvii. f.

* Smith Woodward, Quart. Journal Geol. Soc., vol. xliii., Pl. x., fig. 5.

† *Ibid.*, Pl. x., fig. 12.

‡ *Ibid.*, Pl. x., fig. 11.

§ Catalogue Fossil Fishes British Museum, pt. i., Pl. v., fig. 3.

Cambridge; but neither this, nor any similar known fossil, reveals the precise form and proportions of the several dental series in the species in question.

II. PTYCHODUS POLYGYRUS, Agassiz. (Figs. 15—20).

The second group of teeth under consideration comprises nearly seventy examples, and was discovered in the debris from a fall in the chalk cliffs between Folkestone and Dover. It represents the form of *P. polygyrus*, to which Agassiz applied the varietal name of *marginalis*; and six of the principal teeth are shown in figs. 15—20. No member of the upper median series appears to be preserved; but there are several specimens of the lower median tooth (fig. 15), and these are of interest as being identical with the large broad tooth, which was erroneously assigned to *P. latissimus* by Agassiz,* and has recently been removed to *P. polygyrus* by the present writer, from a study of specimens in the British Museum.† The originals of figs. 16 and 17 are two forms of teeth probably referable to the first lateral series of the upper jaw; and the second specimen exhibits two unsymmetrically placed areas of wear. Figs. 18 and 19 represent two somewhat smaller teeth that may have occupied a similar position in the lower jaw; and a tooth evidently of the second lateral series, either upper or lower, is shown in fig. 20. The latter is narrower in proportion to its length than the principal teeth already noticed; but the characters of the crown and its superficial ornamentation are obviously the same. Several of the smaller lateral teeth, more outwardly placed, agree precisely with that just referred to in form and coronal configuration; and it is only in the outermost smallest teeth that the characteristic features of the dental crown in the species are unrecognisable.

In all these teeth, it will be observed, the crown is little elevated, with a broad flat top; and the transverse coronal ridges vary from about eight to ten in number, while the peripheral area is coarsely granulated and rugose, without any diverging furrows. Although, as remarked by Agassiz, *P. polygyrus* is a specific name applied to many closely related

* Poiss. Fossiles, vol. iii. (1843), p. 157, Pl. xxv. a, fig. 8.

† Catalogue Fossil Fishes British Museum, pt. i. (1889), p. 143.

varieties of teeth, there is thus proof that these various forms do not occur in the different parts of a single mouth, but are severally characteristic of distinct individuals, which may represent as many "varieties," if not "species."

A. SMITH WOODWARD.

EXPLANATION OF PLATE I.

(*This Plate is presented to the Society by W. REED, Esq., F.G.S.*)

Fig. 1. *Platychærops Richardsons*, Charlesworth; palatal portion of skull. London Clay, Herne Bay (Reed Collection). Fig. 1a. Right upper molar 2, three times natural size.

Fig. 2. *Ctenodus interruptus*, Barkas; left lower tooth. Carboniferous Limestone, Gilmerton, near Edinburgh. *x.*, broken anterior ridge.

Fig. 3. *Ptychodus mammillaris*, Agassiz; lower median tooth, coronal aspect. Chalk, near Rochester (Reed Collection). Fig. 3a. Ditto, transverse section of crown.

Fig. 4. Ditto; upper median tooth, coronal aspect, associated with the preceding. Fig. 4a. Ditto; transverse section.

Figs. 5—14. Ditto; coronal aspect of ten lateral teeth, associated with the preceding. Figs. 6a, 7a, 11a, 14a. Ditto; transverse sections of dental crowns.

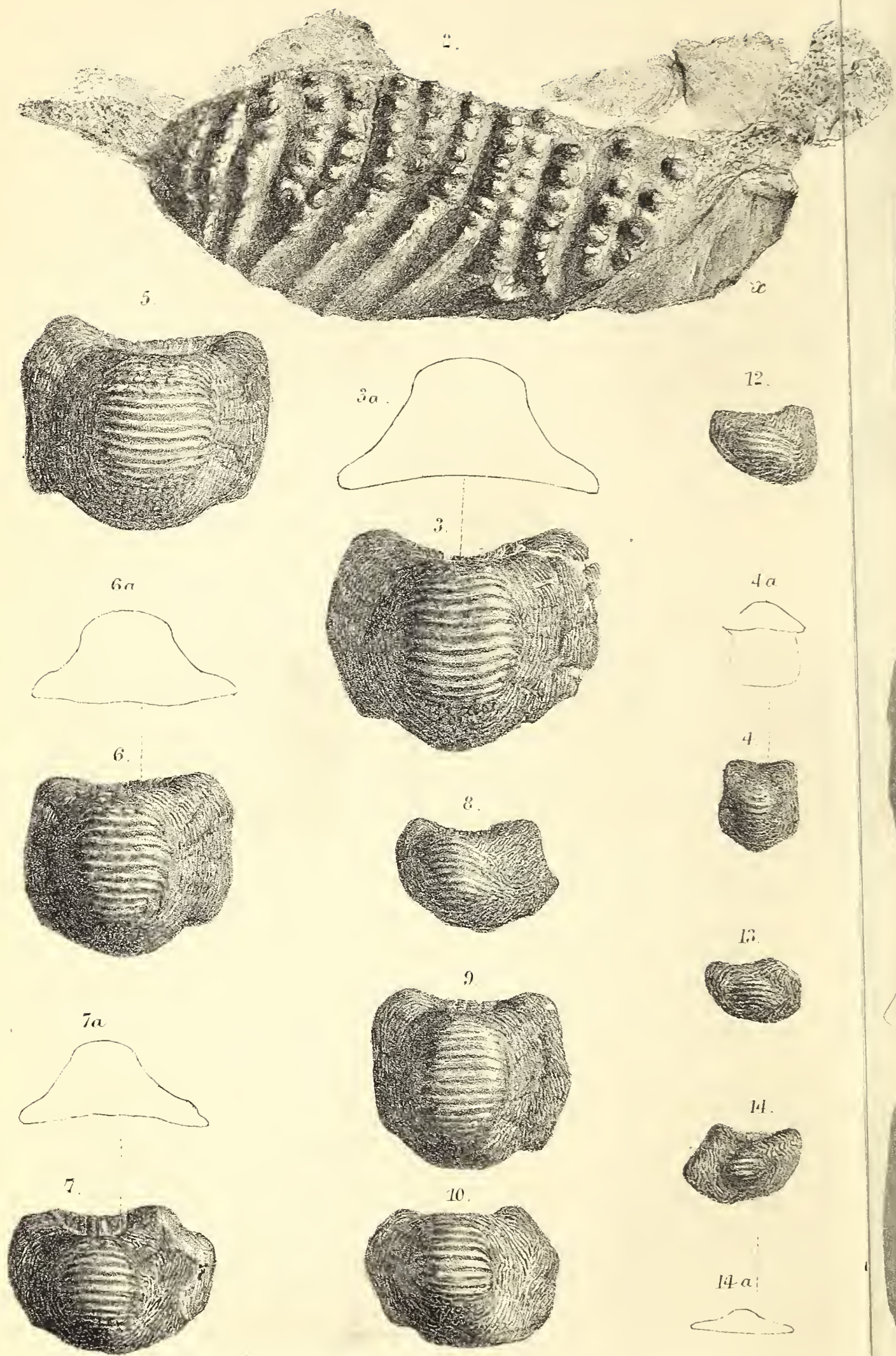
Fig. 15. *Ptychodus polygyrus*, Agassiz; coronal aspect of lower median tooth. Chalk, between Folkestone and Dover (Reed Collection). Fig. 15a. Ditto; transverse section of dental crown.

Figs. 16—20. Ditto; coronal aspect of five lateral teeth, associated with the preceding. Fig. 16a. Transverse section of dental crown.

Unless otherwise stated, the figures are of the natural size.

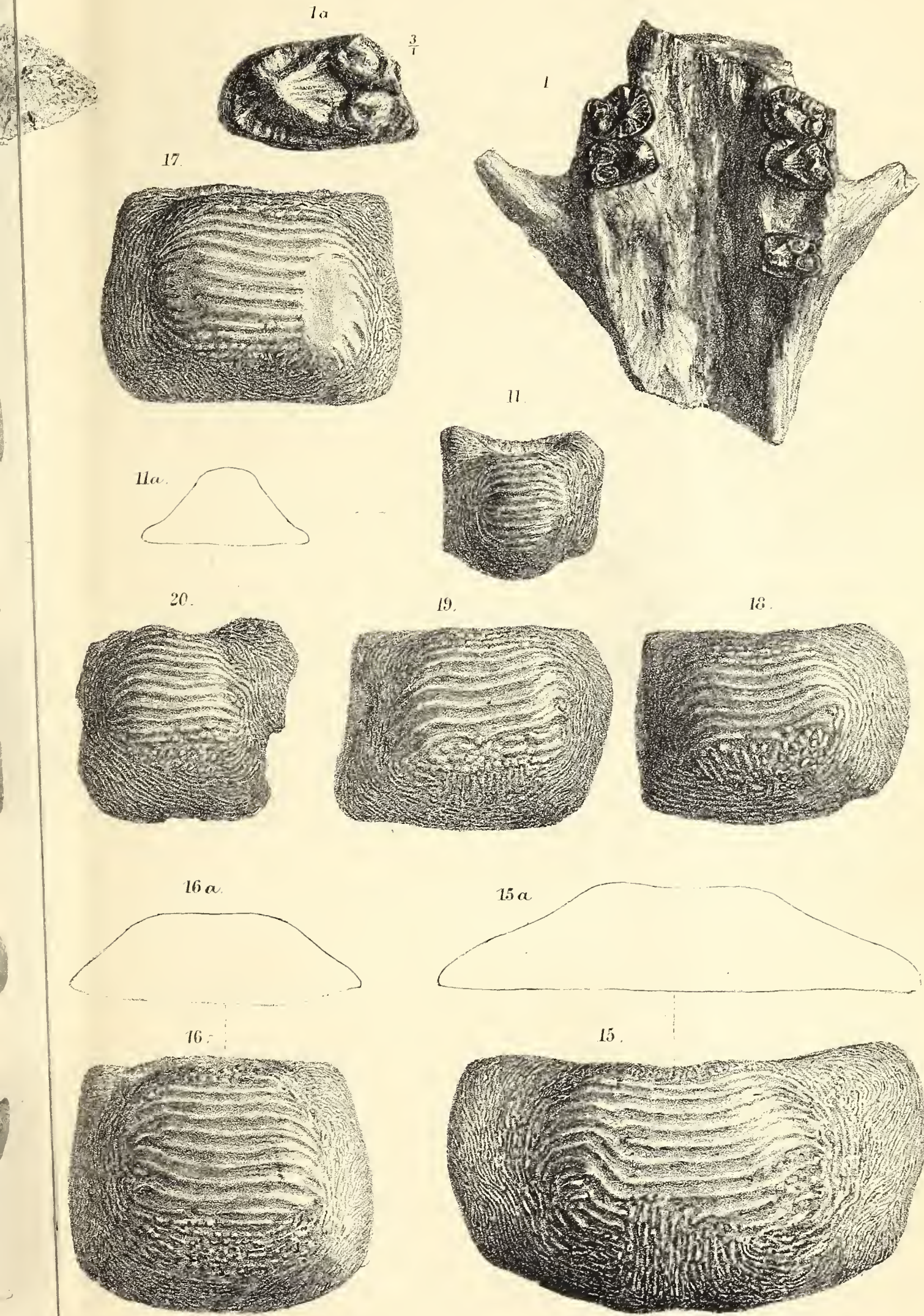






E. H. Michael del et lith.

1. PLATYCHÆROPS RICHARDSON.
3-14. PTYCHODUS MAMMILLARIS.





1852. 27

